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CASE 1908

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF
SHI, ET AL.
S.N. 09/817,419
FILED: 26 MARCH 2001
FOR: CEREAL GRAINS WITH HIGH TOTAL DIETARY FIBER AND/OR RESISTANT STARCH CONTENT AND PREPARATION THEREOF

Group Art Unit: 1761
Examiner: TRAN LIEN, THUY

Commissioner of Patents and Trademarks
Washington, D.C. 20231

REPLY BRIEF

This is in response to the Examiner's Answer dated 02 January, 2004. Applicants have only addressed those points which have not yet been previously addressed.

Examiner's Section 10: Grounds of Rejection

I. The Examiner argues that the Whitney process is the same as the claimed process as "the moisture content and the heating temperature and time are within the claimed ranges." One skilled in the art understands that different moisture content/temperature/time combinations will result in the starch of a grain being or not being completely gelatinized based on the grain type. For example, a combination which would gelatinize normal maize, may not gelatinize high amylose maize as the latter has a higher gelatinization temperature. Thus, the properties as claimed are not inherent in the Whitney grain, as alleged by the Examiner, merely because they are subject to the "same" treatment. This would only be true if the same grain type is used. This is why the claim states that the process is conducted under a combination of conditions such that the starch does not have its granular structure and birefingence destroyed and the total dietary fiber is increased at least 10%. One skilled in the art is able to determine such conditions for each grain.

IV. The Examiner argues that Whitney does not disclose a grain having an amylose extender gene, but that Ferguson discloses such a genotype in which the starch comprises at least about 75% amylose. The Examiner then argues that it would have been obvious to one skilled in the art to use any known grain in the Whitney process as Whitney does "not limit the process to a specific grain and disclose that a variety of grain can be used." However, there is no suggestion in Whitney that high amylose grains could be used although they were well known at the time of the invention. In addition, one skilled in the art of cereal making knows that high amylose grains are more difficult to cook out and have other attributes that would lead the skilled artisan away from using such grain, such as harder bite. Further, there is no suggestion in Whitney or Ferguson that such a high total dietary fiber (TDF) would be achieved by such combination. Thus, one skilled in the art would not chose to combine Whitney and Ferguson to increase the TDF of grain as in the present invention.

Examiner's Section 11: Response to Argument

Further to the Examiner's argument regarding the entire teaching of Whitney, it is Applicants' opinion that the Examiner picks and chooses the statements she wants to support her argument, ignoring the rest. No attempt is made to explain what is meant by statements contradictory to the Examiner's argument, for example, the statement that if the starch is not fully gelatinized, the grain will not shred properly. The teaching of the reference must be read and considered as a whole to determine the teachings and intent of the inventors.

The Examiner states that Applicants do not have any evidence to show that if the starch is not fully gelatinized, the grain will not process properly and will have undesirable eating properties. Applicants do not need such evidence as it is stated in Whitney. See column 1. "Undercooked berries tend to be hard and brittle; also biscuits made from shredded undercooked berries have a tendency to disintegrate and to rise inadequately during baking. Overcooked berries are sticky, have poor handling properties, and are more difficult to shred."

The Examiner states that the description does not give the degree of gelatinization as the term "some crystallinity" is not quantitatively defined. However, one skilled in the art would not define the degree of gelatinization with a percent, but with terms such as Applicants use, "so that the granules are birefingent." Determination of birefringency is well known in the art, is a simple and quick test to conduct, and is commonly

used to define the degree of gelatinization retained by a starch granule. When a grain is substantially cooked, it will lose its birefringency.

The Examiner also states that the declaration only shows one example and thus is not commensurate in scope with the application which teaches different grains and cooking conditions. However, the declaration was to defeat the alleged anticipation of Whitney, showing that the Whitney example did not fall within the present application. The application shows that the invention is functional with examples showing a variety of grains, moisture conditions, temperatures and times, commensurate with the claims. Further, it is not necessary to show a comparison to every aspect of the prior art, only to that closest to the Applicants invention.

The Examiner also states that that the present claims do not recite that the starch is not gelatinized, only that the starch does not have its granular structure and birefringence completely destroyed. This is the same as the starch not being gelatinized. As one skilled in the art of starch, gelatinization is the collapse of molecular orders within the starch granule such as native crystalline melting and loss of birefringence. SeeThomas and Atwell, Starches, Eagan Press Handbook Series, Minnesota, pg. 5 [enclosed].

In light of the above arguments and those made previously, reconsideration is requested.

Conclusion

Appellants again submit that the claimed subject matter is not anticipated by Whitney, et al. (US 5,972,413) and would not have been obvious to one skilled in the art from the disclosure of Whitney in view of Fergason, et al. (US 5,300,145).

The rejection of record cannot be sustained and the Board is respectfully requested to reverse the examiner's rejection.

Respectfully submitted,

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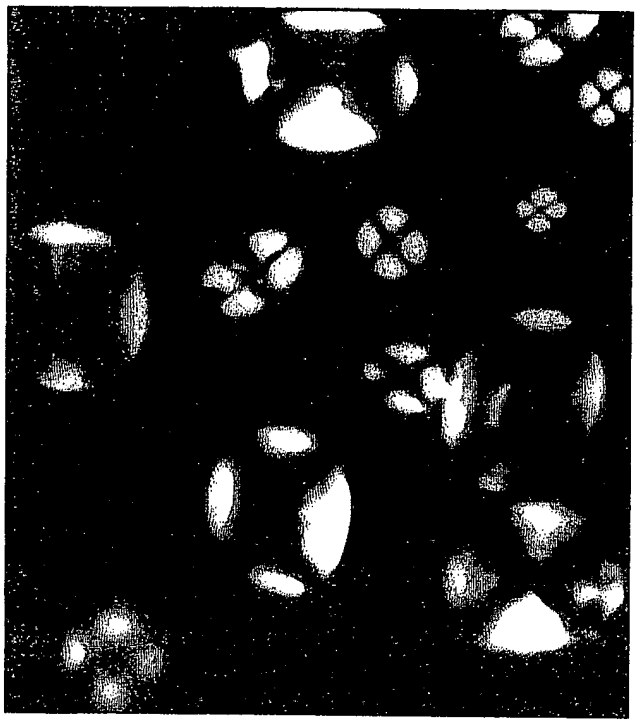
P. O. Box 6500
Bridgewater, New Jersey 08807-0500

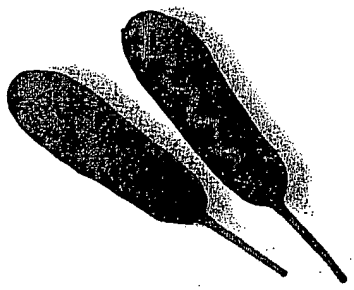
Date: 2 Mar 04

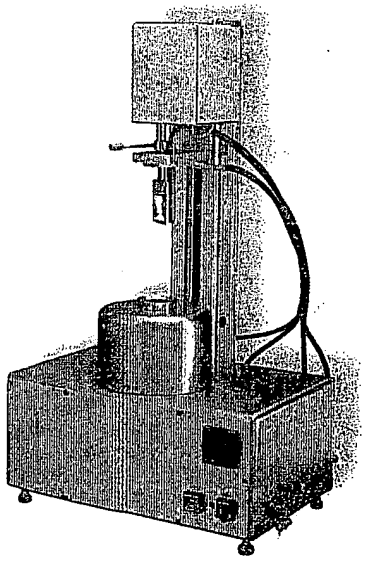
56334

EAGAN PRESS HANDBOOK SERIES

Starches







PRACTICAL GUIDES FOR THE FOOD INDUSTRY

Eagan Press Handbook Series

Starches

David J. Thomas and William A. Atwell

eagan press
St. Paul, Minnesota, USA

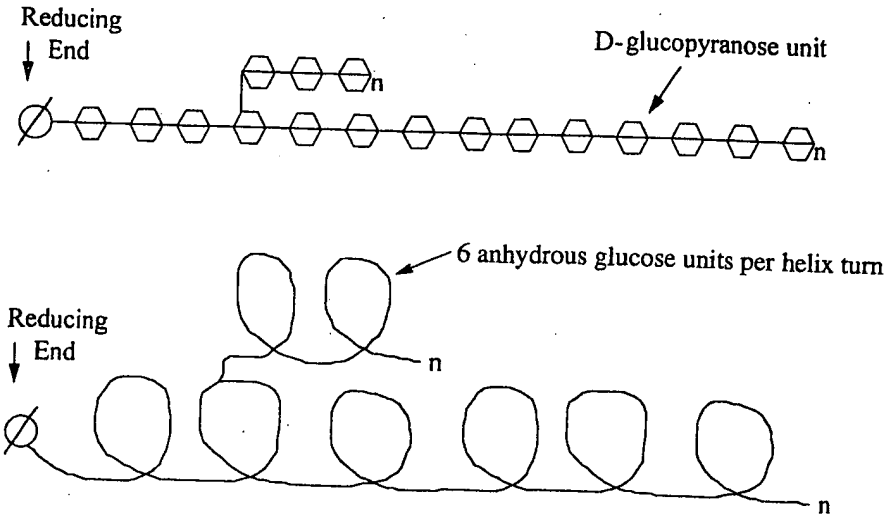


Fig. 1-4. Amylose models. Amylose can be depicted as either a straight chain or a helix.

plex" (Fig. 1-5), as it is often called, can alter the properties of the starch. As depicted, the hydrophobic core of the amylose helix complexes with the hydrophobic constituent. Amylose complexation with fats and food emulsifiers such as mono- and diglycerides can shift starch *gelatinization* temperatures, alter textural and viscosity profiles of the resultant *paste*, and limit *retrogradation*. (Gelatinization, pasting, and retrogradation are discussed in Chapter 3.)

Another well-known attribute of amylose is its ability to form a gel after the starch granule has been cooked, i.e., gelatinized and pasted. This property is evident in the behavior of certain amylose-containing starches. *Corn starch*, wheat starch, rice starch, and particularly *high-amylose corn starch* isolated from hybrid corn plants are usually considered gelling starches. Gel formation is primarily the result of the reassociation (i.e., retrogradation) of solubilized starch polymers after cooking and can occur quite rapidly with the linear polymer amylose.

AMYLOPECTIN

The literature proposes several models for helical configurations, branch chains, cluster patterns, and molecular dimensions of amylopectin. The evolution of the amylopectin model has progressed with the increasing sophistication of biochemical techniques.

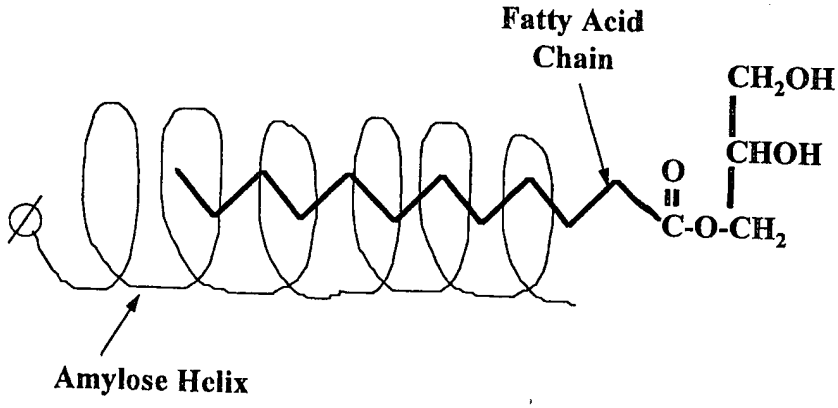


Fig. 1-5. Starch-lipid inclusion complex. An amylose helix is complexed with the fatty acid chain of a monoglyceride.

Gelatinization—Collapse (disruption) of molecular orders within the starch granule manifested by irreversible changes in properties such as granular swelling, native crystalline melting, loss of birefringence, and starch solubilization.

Paste—Starch in which a majority of the granules have undergone gelatinization, giving it a viscosity-forming ability. Pasting involves granular swelling and exudation of the granular molecular components.

Retrogradation—Process during which starch chains begin to reassociate in an ordered structure. Two or more starch chains initially form a simple juncture point, which then may develop into more extensively ordered regions and ultimately, under favorable conditions, to a crystalline order.

Corn starch—Common corn starch composed of approximately 25% amylose and 75% amylopectin.

High-amylose corn starch—Starch isolated from a hybrid corn plant that contains greater than about 40% amylose. Some high-amylose corn starches now contain as much as 90% amylose.